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UNITED STATES NAVY

MEDICAL NEWS LETTER

Christmas Message from the Surgeon General December 1960

At this season of the year
may I intrude into your lives
and extend to each and every member
of the Medical Department of the U.S. Navy
the warmest of greetings
and the sincerest of good wishes

To all those fortunate enough to be at home
I am glad with your gladness

To all those serving far away in the line of duty
my hand is strong in its firm clasp of gratitude
and my wish for your happiness
is heartfelt and deep

God rest ye merry, gentlemen
God rest ye merry, gentlewomen

May joy, and happiness, and love, and sense of duty
ring out like the notes of Christmas bells

R. W. Hogan

United States Navy

MEDICAL NEWS LETTER

Vol. 36 Friday, 16 December 1960 No. 12

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Surgeon General

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Regional Anesthesia for Surgery of Extremities

The past decade has seen many significant advances in anesthesiology, both in concepts and in clinical practice. Almost incredible progress in surgery has emphasized the urgent need for commensurate improvement in anesthesiologic care. A remarkable increase in knowledge of alterations of physiologic functions has ensued together with a marked revision of numerous concepts of anesthetic management and a consequent development of many new agents, new techniques, and entirely new anesthetic methods.

All of these factors have profoundly affected the status of regional anesthesia and indicate an obvious need to reassess the method to place it in proper perspective. This is especially true of its use in surgical procedures involving the extremities.

Advantages of Regional Anesthesia

In selected cases, regional anesthesia, when properly administered and completely effective for the duration of the operation, offers certain advantages to patient and physician not obtainable with general anesthesia. This is particularly true in operations involving the extremities as block anesthesia of these regions does not interfere with cardiovascular and respiratory homeostatic mechanisms. Regional anesthesia is particularly useful in urgent situations when little is known about the patient. If shock is caused by pain, regional anesthesia effects rapid improvement by relieving the pain. Patients in shock from any cause tolerate regional anesthesia better than they tolerate general anesthesia. Regional anesthesia also is of great value when it is necessary to operate on a patient whose stomach contains undigested food.

The advantage of regional anesthesia for outpatients and for persons who dread losing consciousness has been recognized for years. The method is also preferable when prone, lateral, and other unusual positions are to be employed. Whenever fluoroscopy or roentgenography is a necessary adjunct to the surgical procedure, regional anesthesia eliminates the danger of explosion, respiratory depression or obstruction in the darkened room, and enables the patient to cooperate with the surgeon.

One of the most significant advantages of regional anesthesia to the patient is the minimal postanesthetic nausea and vomiting. Additionally, the immediate postoperative period can be made pain-free by use of longer acting local anesthetics. All of these factors permit earlier ambulation and oral feeding, and consequently reduce postoperative pulmonary, gastrointestinal, and thromboembolic complications.

Benefits to the surgeon also are numerous. Motor power may or may not be abolished by varying the strength of the anesthetic solution. In the absence of an anesthesiologist, a surgeon experienced in regional techniques

may block the operative field and then perform the operation. Although this practice should be discouraged when unnecessary, it is of great advantage in rural areas where a specialist in anesthesiology is not always available. In addition, regional anesthesia makes possible many minor operations in office practice. It is economical to use, and the necessary equipment can be transported easily.

Nurses appreciate use of regional anesthesia because the patients return to the wards awake, without nausea or vomiting, and are able to help themselves immediately.

Disadvantages of Regional Anesthesia

One of the most significant disadvantages and limitations of regional anesthesia is that its techniques are more difficult to master than are those of general anesthesia. A certain amount of discomfort is inherent in the method. Regional anesthesia, like many other methods, is not applicable to all circumstances and patients. As with general anesthesia, complications—some of which may be serious—can and do occur.

Requisites for Optimal Results

To obtain optimal results with regional anesthesia, both the physician and the patient should have a comprehensive conception of the block procedure. The physician must have a thorough and exact understanding of the anatomy involved and the effects which interruption of nerve impulses will have on physiologic processes. Of utmost importance is the necessity for preparing the patient psychologically and pharmacologically.

Anesthesia for Upper Extremities

Brachial Plexus. Brachial plexus block may be used for any operation of the hand, forearm, and lower part of the arm. Supplementing this technique with subcutaneous infiltration anesthesia on the medial and lateral aspects of the upper portion of the arm produces complete anesthesia of the entire extremity so that operations of the shoulder may be included. This procedure also is especially useful in controlling severe postoperative pain and as a diagnostic and therapeutic measure in such disorders as reflex dystrophy, postamputation pain, causalgia, and peripheral vascular disorders associated with orthopedic management.

The technique for brachial plexus block which has given best results is a modification of the supraclavicular approach which is described. The disadvantage of this approach is that, occasionally, pneumothorax develops as a result of inadvertent puncture of the lung. This can be avoided with careful technique. Other complications can be avoided by careful attention

to each step. The advantages of this block over other regional techniques are: (1) the plexus is simpler to locate, (2) onset of anesthesia is more prompt, (3) duration of anesthesia is longer because the solution is injected into a relatively closed fascial compartment, (4) the entire extremity is anesthetized except the skin of the medial side of the arm and deltoid area, and (5) a tourniquet may be used.

Major Nerves in Axilla or Upper Arm. The problem of pneumothorax in the use of supraclavicular brachial plexus block has prompted many clinicians to substitute block of the major nerves in the lower part of the axilla or the upper region of the arm. This procedure may be employed for all operations of the hand and forearm and lower part of the arm. If supplemented with subcutaneous infiltration anesthesia, it may be employed for operations of the upper part of the arm. Its disadvantages, compared with supraclavicular brachial plexus block, are that sometimes it is more difficult to locate the nerves and the anesthesia is slower in onset, of shorter duration, and requires greater concentration of local anesthesia.

Major Nerves at the Elbow. The medial, ulnar, and radial nerves may be blocked at the elbow or wrist by well-known techniques. Supplementing this block with subcutaneous infiltration anesthetizes the extremity distal to the elbow. This procedure may be used for any operations of the hand and forearm.

Wrist Block. Block of the ulnar and median nerves can be accomplished easily at the wrist. Because of the terminal branching of the radial nerve, it is necessary to employ subcutaneous infiltration anesthesia in the dorsal aspect of the wrist to anesthetize the structures supplied by this nerve. Injection of the medial and ulnar nerves in the volar surface of the arm, together with subcutaneous infiltration in the dorsal and volar surfaces, will anesthetize the entire hand and, therefore, can be used for any operation in this region.

Blocks at the elbow and wrist offer the advantage of involving only a small portion of the extremity. However, they do not permit use of a tourniquet which frequently is necessary.

Infiltration and Field Blocks. Infiltration techniques may be used for minor surgical repairs of lacerations of the skin and subcutaneous tissue, for closed reduction of certain fractures, and for very minor operations of the fingers. Metacarpal or digital field blocks are quite useful if carried out properly. These procedures produce minimal disability and carry a minimal risk of toxic reactions; therefore, they are frequently employed in the physician's office for minor operations.

Anesthesia for Lower Extremities

Subarachnoid Block. The simplicity and facility of spinal anesthesia are too well known to warrant discussion. The procedure is especially useful

in the hands of a physician who has limited experience with other techniques. It is particularly applicable in extensive reconstructive operations about the hip joints, cases of fracture, and any other operations on bones, muscles, joints, and soft tissue of the extremity distal to the hip.

It is extremely important to avoid extension of the subarachnoid block above the 10th thoracic segment to obviate extensive vasomotor paralysis and consequent hypotension. However, the large vessels in the lower extremity receive sensory fibers and sympathetic nerves that enter the spinal cord at the T10 to L3 segments of the spinal cord. Therefore, it is necessary to carry the block as far as T10.

Caudal Block. Single or continuous caudal anesthesia may be employed in a manner similar to subarachnoid block for surgery of the lower extremities. Since the dura is not perforated, there is an obvious advantage over subarachnoid block; postanesthetic headache does not occur, and the potential hazard of extremely rare postblock neurologic sequelae is eliminated.

Spinal Epidural Block. Anomalies of the lumbar spine are much less frequent than are anomalies of the lower sacrum; therefore, spinal epidural block affords a greater degree of success in the hands of a physician equally skilled in each technique. Moreover, a smaller volume of anesthetic solution is not necessary.

Major Nerves at the Level of the Hip. Sciatic nerve block is an extensively useful regional anesthetic procedure which can be mastered easily. It may be used for closed reduction of fractures of the ankles and feet and to effect sympathetic block of the lower extremity to confirm the results obtained with lumbar paravertebral block. When combined with block of the femoral nerve, it provides anesthesia of the foot or leg and, therefore, can be used to advantage for operations and manipulations of these regions.

The obturator nerve usually is blocked in the obturator foramen. Injection of the sciatic, femoral, and obturator nerves produces adequate anesthesia of all the deep structures of the lower extremities below the hip joint. A tourniquet may be used without discomfort because all the muscles are anesthetized. Block of the lateral femoral cutaneous nerve completes analgesia of the extremities.

Blocks at Knee, Ankle, and Foot. Block of the common peroneal and tibial nerves may be effected at the level of the knee. Supplementing these injections with subcutaneous infiltration will anesthetize the entire leg and foot. Blocks of the saphenous nerve may also be carried out individually on the medial aspect of the medial condyle of the tibia. Because the saphenous is purely a sensory nerve, it may be blocked not only for surgical procedures but also for intractable pain. Block of the deep peroneal and tibial nerves at the ankle, supplemented by subcutaneous infiltration, will produce anesthesia of the entire foot and may be employed for minor orthopedic operations in this region. Metatarsal field block also may be used for operation involving the toes. Field block in various parts of the leg and foot may be similarly used

as mentioned in connection with anesthesia for the upper extremity. (J. J. Bonica, Regional Anesthesia for Surgery of the Extremities: Postgrad Med, 28: 324-332, October 1960)

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Acute Facial Injuries

A large percentage of the "traumatic" cases seen in the receiving ward of a general hospital are cases of acute facial injuries. Most frequently they occur in automobile accidents; next in frequency are those caused by blows with a blunt object. A smaller number are due to knife or gunshot wounds.

It is best to manipulate and reduce fractures of the face as soon as possible rather than wait a few days for ecchymosis and swelling to subside. When an accident case is first seen, of primary importance is treatment of shock and bleeding. A thorough appraisal of the patient's general condition should be made, all appropriate specialty consultants being called in. An adequate airway must be assured; if necessary, a tracheostomy is in order. X-rays are taken in the receiving ward; antibiotics, antitetanus serum, and necessary supportive measures are administered.

As soon as the patient's general condition allows, he is moved to the operating room where soft tissue and bone damage are assessed separately. Anesthesia is administered via an endotracheal airway in almost all cases to maintain an adequate airway. Wounds are given massive lavage with sterile water or saline and a thorough debridement with removal of any foreign bodies is performed. In the past, expectant immobilization of these injuries has been the accepted method of therapy. The author considers that immediate maximum exposure allowing complete diagnosis and definitive repair is most saving of the patient's morbidity, and hospital time and expense.

Fractures involving the orbital rim and zygoma are most frequent. The next most common fractures are those involving the nasal bones and septum; the least common are those of the maxilla and the mandible.

In fractures of the malar eminence and zygoma there are trismus and pain on moving the lower jaw due to involvement in the region of the coronoid process of the mandible. Such symptoms are relieved by reduction of the fractures. Diagnosis of fracture is best made by presence of periorbital ecchymosis and palpation of the orbital rim. Anesthesia of the infraorbital nerve distribution, when it can be elicited, is of value in making the diagnosis. Sometimes, an obvious downward slant of the involved palpebral fissure is seen. X-ray evidence of fracture (as well as diplopia) may be absent. The involved antral area will transilluminate poorly. Frequently, simple fractures can be handled by manipulation under general anesthesia; others require more complex procedures.

The most important problem in treatment of fractures of the maxilla is restoration of normal occlusion of the teeth. Leaking of cerebrospinal fluid is not a contraindication to reduction of maxillary fractures. The author has found that reduction of fractures involving this area and the cribiform region are best treated immediately; many days of the prerehabilitation period may be saved. Immediately after surgery, all patients are given large doses of antibiotics and buccal streptokinase-streptodornase continuously during the period of immobilization.

Diagnosis of a maxillary fracture is not difficult. A reliable test for abnormal mobility is simply to grasp the maxilla with the fingers of one hand and test for movement while holding the head steady with the other hand. One should not rely on x-ray for a positive diagnosis because these fractures are not always seen on the x-ray film even though they may be present.

Attempts have been made to classify the various degrees of maxillary fracture. Clinically, this is unimportant because—regardless of the size or degree of fracture—all actions are directed toward attaining proper occlusion of the teeth. If this is accomplished, the fractures will be properly reduced.

Fractures of the nasal bones are most frequently involved in facial injuries because the nose is the most prominent part of the face and is not particularly strong structurally. These breaks almost always occur along with fracture separation of the nasal septum. Epistaxis is an almost constant occurrence in nasal trauma. X-rays may be of help but, again, should not be relied upon to make a positive diagnosis. The diagnosis is usually obvious by the presence of deformity and abnormal mobility. Treatment should be instituted before swelling becomes marked. Local anesthesia is preferred in these cases.

Fractures of the mandible are not too frequent. When they are present, the author often treats them in the oral surgery department. Wiring of fragments may be performed in many ways.

Soft tissue repair is never done until all fractures have been reduced and immobilized as much as possible. There is no fixed formula for procedure in the suturing of wounds. One must frequently do a great deal of improvising according to the results desired. Skin edges must be trimmed to be as straight as possible in order to allow good approximation. A magnifying head loupe is a great help in the meticulous placing of subcutaneous and skin sutures.

While procedures employed by the author in the care of facial injuries differ only a little from what previously has been done, he considers that the immediate care of these problems has reduced the hospital stay materially and has aided early rehabilitation of patients. Direct visualization of fracture sites (a take a look and see attitude) and the wiring of fragments rather than blind manipulation appear to be of utmost importance and yield gratifying results. (Louis A. Safer, Acute Facial Injuries: Arch Otolaryng, 72: 575-580, November 1960)

Fat Embolism and a Fat Center

Fat embolism is recognized as a frequent cause of death following severe injury accompanied by fractures, severe crushing, et cetera. Careful search also discloses the presence of fat embolism in death from many other diseases. Unfortunately, routine methods of preparation of tissue for section removes fat, and unless special techniques such as frozen sections are used, the presence of fat is unknown.

Misgivings regarding the theory of "the origin of fat from fractured bones" was further supported in the mind of the author by the death from fat embolism of two patients in whom no injury in the form of violent trauma and fractures was found.

As shock is a factor at some stage in most patients dying of fat embolism, the author decided to investigate whether shock alone might produce fat embolism. Reproducing fat embolism in dogs by means of peptone shock met with only moderate success.

Because Claude Bernard demonstrated presence of a diabetic center in the floor of the fourth ventricle, it seemed reasonable that perhaps fat might be under the control of a center simulating those found for other functions. Perhaps, when fat is ingested, it is not left to chance which portion will be used for energy or which will be stored permanently. The mechanism for storing fat, mobilizing it, and using its stores is still to be discovered.

Considering these possibilities, a search for evidence of the existence of such a center was begun. Eventually, in the rabbit an area of the hypothalamus was found which responded to mechanical stimulation by a rapid and distinct rise in the level of fat in the blood stream. Local application of citric acid, boric acid, and molybdic acid on this center had no effect on blood fat; however, trauma to an extremity produced a sudden fairly sharp rise in blood fat. In contrast, if eserine or acetylcholine were given, there was little and, in some cases, no rise of the fat.

The next experiments were performed to investigate various substances which might possibly have some effect in controlling the rise of blood fat induced experimentally. The theory was advanced that an appropriate drug might attack the fat center and thereby reduce the fat level in a patient once it had risen following an accident. Such a drug might be some protection against the late and fatal effects of fat embolism. Better still, perhaps a suitable drug might narcotize the fat center. Eserine produced the most striking effects, although acetylcholine produced noticeable effects.

The effects of shock from hemorrhage and intestinal obstruction were also studied, but the results were not conclusive.

In the clinical problem of fat embolism, it is postulated that perhaps the stimulation of the fat center with liberation of fat may be the important feature in causing fat embolism. This may be caused by severe trauma in which fractures frequently occur, but the fractures may be only coincidental.

Shock, severe illness, severe toxemia, et cetera, in the author's early experiments appear to be adequate stimuli affecting the fat center, causing mobilization of fat. In further experiments, the author hopes to test other drugs and various inhibitors and stimulants which might be used clinically to ablate or put this center at rest in situations in which the possibility of fat embolism arises. These observations may stimulate further interest in this unexplored field. Some useful applications might readily be discovered. (G. Murray, Fat Embolism and a Fat Center: Amer J Surg, 100: 676-681, November 1960)

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Of Cancer and Viruses

Cancer as a disease entity presents the most complex and difficult challenge which the surgeon is called upon to face. The mode, vigor, design, and direction of attack upon this entity, either in the general or specific sense, are conditioned by concept of the nature of this bizarre disease. The surgical and radiotherapeutic approach to cancer is predicated upon the assumption, supported by morphologic observation, that cancer is a disease of cells, that some cells in a local site undergo transformation into cancer cells, and that if extirpation of this local cell group is carried out, the patient will survive. This concept implies a local transformation, presumably due to local influences, in which a cell goes awry, producing daughters that no longer obey or conform to the laws of the body, thus demonstrating autonomy. These cells produce local phenomena by cellular proliferation and distant phenomena by cellular migration and implantation. The properties of proliferation and migration are properties of cells that respond to the stimulus of inflammation, such as the histiocytes, leukocytes, macrophages, and plasma cells. During recent years, some interest has been shown in the idea that neoplasia, in general, represents a type of cellular response to some inciting agent in a manner somewhat resembling the cellular response to any inflammatory stimulus.

Recent demonstrations of the relationship between smoking and lung cancer have subtly implied that an agent in the smoke alters the bronchial epithelium in such a way as to promote the proliferation and migration of epithelial cells. This has been the latest in a long series of observations relating the origin of human and animal cancers to a presumably specific agent. Probably, it is not too far afield to state that most workers believe there are one or more agents which, when introduced into a receptive cell, will cause that cell to undergo changes characteristic of cancer. Tumors in chimney sweeps, aniline dye workers, Schneeberg cobalt miners, and American smokers have been cited as examples of chemical carcinogen activity. However, none of these clinical examples, and few of the

chemical carcinogen experimental cancers, have shed light upon the genetic, biochemical, or enzymatic alterations which have led directly to cancerous activity.

Currently, the most acceptable thesis states that normal cells undergo transformation to autonomous malignant cells, but in laboratory animals most autonomous tumors develop from preexisting dependent tumors or precancerous lesions; it is not beyond the realm of possibility that the same may eventually be noted to be true for human cancers. Should this become a fact, present thinking may have to be reoriented toward the possibility that chemical carcinogens may merely alter the recipient cell and thus make it susceptible to an agent which is able to cause genetic and somatic mutations which are transmissible to the daughter cells. It goes without saying that whatever imprint is made upon the original cell during its transformation must be transmitted through many generations. This transmission may be affected by an original genetic mutation that breeds true, or by nuclear-somatic transmission of the agent or the agent's offspring, to the cellular offspring. The latter possibility, of course, suggests infestation with an agent such as a virus.

There has been fairly conclusive evidence that in experimental animals a few cancers have viruses as their etiologic agent—mouse leukemia, rabbit papillomatosis, chicken sarcoma, mouse mammary tumor, frog renal carcinoma, and the multiple organ tumors caused by the mouse polyoma virus, to mention a few. These tumors have yielded the information that cancer viruses are not always similar to each other. The Rous sarcoma virus contains nucleic acid of the ribose type (RNA) while the Shope papilloma virus contains nucleic acid of the deoxyribose type (DNA). By using fluorescent antibodies, it has been possible to demonstrate that the mature virus is present only in the keratinizing (old) papillomatous cells in the rabbit papilloma, implying that in the young daughter cells the virus is present in an immature form.

It seems reasonable to expect that some human cancers will soon be proved to be due to viral infestation. Dmochowski has identified virus particles in human leukemia; Fortner has produced bile duct cancer in hamsters with human bile; Grace has produced malignant tumors in mice by cell-free extracts from human tumors; Powers has induced hyperplasia in hamsters by cell-free extracts from the sputa of patients with pulmonary cancer, and Mueller, Menefee, and Ivler have observed virus-like particles in human colon cancer.

The method of establishing that viruses recovered from human cancer have etiologic relationship to that cancer is bound to be extremely tedious. At present, there is no good description of the morphologic response of a cell to the presence of tumor viruses. Grossly, it is possible to note that cell proliferation and migration occur, and this effect can be noted in the whole animal. Microscopically, there has been no consistent intracellular

response to the presence of these viruses and such response, if any occurs, should be observable. Ordinarily, one conceives of the use of Koch's postulates when thinking of the identification of bacteria as etiologic agents for disease, and such orientation has been brought into the infectious virus field. Such opportunities to test the carcinogenic activity of suspected human tumor viruses will be difficult to get, and methods other than human experimentation will have to be devised in order to obtain the required information.

Should the viral etiology of some human cancers be established, its importance to the surgeon is difficult to assess. Such an etiology may well suggest that cancer is a systemic disease whose local manifestations occur because local trauma at the cellular level has set the stage. A precancerous state may thus be a prerequisite to the development of cancer, and if this proves to be true, attention may well be directed toward extirpation of all such precancerous states, rather than toward antiviral therapy of established disease. (C. B. Mueller, Of Cancer and Viruses: Surg Gynec Obstet, 111: 635-636, November 1960)

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Combating Fear in Hospital Practice

One of the characteristics of good physical and mental health in a person is his ability to curb his fears. When it looks to an aging man as if his lifelong good health were about to fail, fear is likely to assail him and soon it may become difficult for him to control it and its effects upon him. Then he will need help, and he may need it badly. He no longer will be able to lift himself out of it. It will be a bad day for him if no one notices his fear or cares anything about it.

It is sad that physicians so often feel they have done their duty when they have given a patient a diagnosis plus a prescription or an operation. They don't stop to take time to help him with his fears. They do not realize how important fear can be in retarding recovery; hence, they do nothing about it. Often, in their hearts, they may even look down on the man who fears. Often, a physician never has much sympathy with his patients and their fears until one day he has to be operated upon; then what a change comes over him! No longer will he just walk out of the room when, after an operation, the patient begs for a few words of encouragement.

Sickness is a humiliating experience for any previously robust person; the weaker and more dependent he gets, the more his dignity is offended. It is normal for a person to glory in his strength, and when this precious asset leaves him, he fears that it may not return or that he might have to pay a crippling price to get it back.

Fear always gets worse and worse when the patient is kept in the dark about his condition and when, day after day in a hospital room, he is left alone

with his thoughts. A man may then become filled with fear of ultimate helplessness or of an inability ever again to earn his living. He may hate to be babied because of his illness. He will hate "cat-washes" and bedpans. As the Roman Emperor Vespasian once remarked, "An emperor who wants to keep his dignity to the end had better die standing up!"

A challenge to hospital administrators are the methods of dealing with the complications of fear. The late George Crile used to go to great lengths to lessen fear in patients who were about to have a thyroidectomy for exophthalmic goiter. He knew that some persons die of fright in the operating room.

Physicians should more often come close spiritually and emotionally to their own patients. You cannot help a drowning man from a distance—you must come close to him. Some physicians, on visiting in a hospital, have been distressed to see other physicians while making rounds go into and out of a room without either greeting or saying good-bye to the patient. This is a poor practice of medicine. Later, when the patient begs the resident or the intern or nurse to repeat anything that the physician said outside in the hall, he may be told that he must get his information from the chief.

Curiously, even a sick physician in a hospital may find it impossible to get information about his condition! He may be treated as if he were a half-wit. His attending physician may drop in for a few minutes; he will look at the chart and say, "You're doing fine, old man," and walk out.

After operations, early ambulation is helpful if only because it cheers the patient and boosts his morale. It helps morale also to have a loved relative with the patient for much of each day: hence, it is advisable to have liberal visiting privileges in a hospital. Often, patients fear going to a hospital because they dread the loss of their "rights" and their liberty. They fear that, in the hospital, they will get only impersonal, mechanical, and routine treatment.

One of the best things a hospital could do to improve its services to people and to maintain better relations with its patients and their families and the public would be to employ one or more hostesses—fine, mature, and kindly women who would give people confidence and clear up many a grievance before it becomes dangerous. (W. C. Alvarez, Editorial, The Need for Combating Fear in Hospital Practice: Geriatrics, 15: 810-811, November 1960)

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Tuberculin Sensitivity of Physicians

While tuberculin testing is common in schools of medicine, there is almost no information on the frequency of tuberculous infection among physicians following internship, residency, and periods of clinical practice. This is because there are no opportunities for systematic mass testing of

physicians. The occupational risk of exposure has been assumed to be considerable in all fields of practice which involve contact with physically ill people, although in such fields as orthopedic surgery and dermatology as contrasted with general practice, pathology, and phthisiology, the risk is probably small. In the United Kingdom, tuberculosis morbidity has been shown to be excessive among pathologists and laboratory technicians. On the other hand, mortality from tuberculosis in the United States is far lower in the medical profession than in the general population. The limited data available suggest that the same may be true of nurses. This paradox might be explained in part by socio-economic factors; in part, by the better opportunity for early diagnosis and adequate therapy which these groups may enjoy. Thus, mortality rates completely fail to reflect the risks of infection and morbidity.

A practical question today is whether BCG vaccination ought to be recommended for students of medicine and nursing. Data on the actual risk of infection in the course of the practice of medicine and nursing would be helpful in answering this question. For these reasons, even fragmentary information on a heterogeneous group may be worthy of presentation.

Over the past 9 years, students at the Johns Hopkins School of Hygiene and Public Health have been systematically tested with tuberculin. Two-thirds of the students are physicians: all have had some postgraduate hospital training; some have been in clinical practice for a number of years while others entered public health almost immediately after their internships. Very few have received BCG vaccine. The remaining third are from other professional fields: nurses, dentists, sanitary engineers, veterinarians, statisticians, and graduate students in the biologic sciences.

Two striking points are revealed by data presented: one is the great difference in reaction-frequency between United States residents and persons in the same professional categories from other countries (for physicians, 46 and 80%, respectively; for other professions, 31 and 66%, respectively). It is unfortunate that the small number of students from any one area precludes more specific comparison by area of residence, but differences clearly indicate the excessive exposures which foreign students as a group have sustained. The second point is the contrast between the reaction-frequency of physicians and that of other professional groups, supporting the view that physicians do have an occupational liability to infection.

The sharp rise in percentage of reactors more than 40 years old among American physicians is thought to reflect not only an age effect, but also the greater opportunity for infection that existed in earlier years. Thus, physicians tested at age 50 were exposed prior to entering medical school to the risks which prevailed from about 1910 to 1930 and to occupational risks from about 1930 onward. There is much evidence that the prevalence of open, and especially undetected, tuberculosis as encountered in hospitals, clinics, and practice is declining.

It would be unwise to venture any strong opinion on whether medical students should receive BCG vaccination on the basis of this highly selected and limited material. Advantages of being able to detect infection early through regular tuberculin testing versus the protection conferred by vaccination have been widely debated. The author's opinion is that vaccination of medical students in the United States is still advantageous, but that in a relatively short period of time the risk may be so low as to warrant discontinuation of vaccination, especially if periodic tuberculin testing is substituted. The hazard for practitioners in some other countries still appears to be great. (P. E. Sartwell, Tuberculin Sensitivity of Physicians: Notes, Amer Rev Resp Dis, 82: 731-732, November 1960)

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Susceptibility and Immunity to Common Cold

Common upper respiratory viral infections, despite their frequency, have been something of an enigma to physicians and scientists in general. Little has been known about their specific etiology and the factors that influence susceptibility or resistance to infection. A prevalent view—even within recent years—has been that there is a common cold virus to which only man is susceptible, and which causes recurrent symptomatic infections without establishing immunity of the host. This concept now appears to be far too simple. Within the last decade, information has accumulated rapidly on the etiology of these common infections and the susceptibility of the host. Tissue culture techniques have extended knowledge of the viruses associated with respiratory illnesses. Controlled experiments with volunteers have permitted observations upon the susceptibility of man.

Viruses and families of related viruses, now numbering approximately 70, have been recovered from secretions of the respiratory tract of persons suffering with respiratory illnesses of varying severity. These viruses propagated in tissue cultures and others associated with respiratory disease include: the several myxoviruses, coxsackie viruses, adenoviruses, ECHO and ECHO-like viruses, and various others of the group. Many of these agents do not produce the common cold as the classic or predominant manifestation of infection. Nevertheless, most if not all—and a few others in addition—can produce a common coldlike illness in some persons. Some of the viruses, as far as is known, cause only symptoms of a common cold; the majority of clinical colds undoubtedly result from infections with viruses of this type of which only a few are known. Viruses referred to as NS agents are demonstrable as infectious material in the nasal secretions of a person suffering with a common cold, but attempts to identify and characterize them in vitro have not been successful.

The authors report observations collected over a 7 to 8-year period from results of experimental challenge of volunteer subjects with one of the common cold agents under controlled conditions. The report is concerned largely with the uncharacterized infectious agents in the nasal secretions from donors with naturally acquired, typical common colds. These have been shown to be several immunologically distinct viruses. Considerable attention has been given to the experimental cold syndrome in volunteers, and to the influence of the virus, the host, and environmental factors, upon susceptibility and the resulting clinical illness.

Each of the viruses can produce a variety of clinical syndromes which are commonly classified under categories of common cold, undifferentiated upper respiratory infection, and "flu." The common cold viruses cause afebrile, acute coryza in the great majority of persons. Influenza, coxsackie and adenoviruses may be considered at the other end of the spectrum of respiratory viral infections in which the major clinical manifestations are fever, pharyngitis, and lower respiratory symptoms, although a smaller number of patients have common coldlike illnesses.

The common cold viruses are present in infectious form in both the cells and fluid of nasal secretions; the titer is sufficient to suggest that droplet spray could be an effective means of communicating infection. Person-to-person transfer, presumably by droplet spray, was observed to cause clinical illness in approximately 10% of persons exposed under experimental conditions, and in 17 to 55% among family members. In contrast to age, multiple colds within the family made little difference upon the secondary attack rate. This observation suggests that the infections were caused by the same virus. The viruses in the community at different times, however, appear to be immunologically different; some seem to cause sharp waves of epidemic illness whereas others are more endemic.

Observations in volunteers make it apparent that there is a distinction between infection and illness. The latter is a variable complex related, perhaps, to the extent of viral infection, psychologic attitudes, and reactions of the host, his physiologic status at the time of contact with the virus, and probably, even his hereditary endowment as judged by proneness to allergic rhinitis. The kind of symptoms by which the infection is manifest also is influenced by the host as well as the virus. The strong positive correlation between the usual number of colds per year by history and symptomatic reaction to an innocuous instillation appears to establish a wide range of difference in the proneness of persons to develop rhinorrhea or coryza. Data do not permit a conclusion as to whether physiologic or psychologic factors are dominant. On either basis, it is surprising that among the subjects who were hyperreactors to an uninfected solution, there was not greater susceptibility to clinical illness from a secretion containing an infectious agent. It may be that there is some sort of reciprocal function in the interplay of psychologic and physiologic factors—if one is heavily weighted, the other is obscured.

For centuries, men have associated the common cold with environmental chilling. Failure to confirm this relationship under conditions of experimental design in volunteers or in isolated arctic communities also has been experienced. Present data seem adequate to conclude that the basis of the association is not the direct activation of latent viruses by physical cold or physiologic reaction to chilling because these factors did not produce colds without infection. Although experimental conditions may not test the proper factors, it would appear that the prevalence of colds during the winter season and their occasional sudden increase following abrupt changes in atmospheric conditions must have some other basis than that of persons becoming chilled. Also, in this study, sleep deprivation and fatigue increased infectivity insignificantly.

The relationship between susceptibility to viral infections and the menstrual cycle or pregnancy has been observed with other viral infections. Present data confirm and extend earlier observation with a larger group of subjects. Although a clear relationship between ovarian or pituitary hormones and the differences in susceptibility is not apparent, it seems possible that the effect is related to changes in the surface mucosal epithelium under the control of the sex hormones.

There is no easy explanation for the epidemiologic and experimental observations that show insignificant immunity to the common cold. The key to the problem is elucidation of the number and specificity of the viruses, rate and extent of the neutralizing antibody response, availability of antibody to the cells of the nasal mucosa and, duration of protection. Pooled human gamma globulin did neutralize the infectivity of several viruses associated with natural common colds.

These observations require the postulate that each viral upper respiratory illness is a specific infection, and thus, that the number of viruses responsible for these infections is great. Other studies have shown that clinical and subclinical infections can occur in the presence of significant serum antibody titers, but these are generally milder illnesses and involve a small proportion of such people. From experimental data, the frequency of common colds is not well explained by recurrent symptomatic infections with the same virus. Under the concept that the common cold is caused by many specific agents, each of which elicits an adequate immunity response, the likelihood of discovering a predominant common cold virus that maintains this role for a long time is quite unlikely. Also, if this is the case, logistics for immunologic control of the common cold may be extremely difficult. (G. G. Jackson, et al, Susceptibility and Immunity to Common Upper Respiratory Viral Infections - The Common Cold: Ann Intern Med, 53: 719-738, October 1960)

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Biomedical Reactor Facility Begun at NNMC

Groundbreaking ceremonies inaugurating construction of the Biomedical Reactor Facility sponsored by the Defense Atomic Support Agency were held at the National Naval Medical Center, Bethesda, Md., 29 November 1960.

The facility, to be known as the Armed Forces Radiobiology Research Institute, will be under the sponsorship of DASA for advanced study and research in the biomedical effects of radiation. The project was initiated in June 1958; the TRIGA (Training, Research, Isotope Production, General Atomic) Mark F Reactor was developed and designed specifically to meet its requirements. Programs will be carried on by scientists of the military services, other federal agencies, and civilian organizations interested in radiation effects.

This is the first pulse type reactor designed solely for medical research. It will provide scientists with laboratory control of dosage and quality of radiation for exposure to biologic systems. The reactor and its associated laboratory and experimental facilities will be built by the General Atomic Division of General Dynamics Corporation, San Diego, Calif., at an approximate cost of $2.4 million and is scheduled for completion in October 1961.

Central feature of the facility will be the advanced TRIGA-type nuclear reactor. It will be the newest member of the versatile and inherently safe family of TRIGA reactors, many of which are currently in operation in some of the world's medical centers, universities, and other research institutions. The DASA-TRIGA will be used as a source of self-limiting amounts of high intensity neutron and gamma radiation for studies dealing with the radiation effects on living organisms, materials, and electronic instruments employed in the field of biomedical research.

The DASA-TRIGA will be located in a water-filled tank approximately 14 feet in diameter and 19.5 feet deep. The floor space required for the reactor itself, exclusive of two exposure rooms adjacent to the reactor tank and other associated facilities, will be approximately 150 square feet. The core of the reactor will be suspended near the bottom of the tank. On opposite sides of the tank will be two cylindrical areas, permitting movement of the core to face either of the two exposure rooms. Rotating lead shielding doors will separate the access from the reactor to each of the exposure rooms. Complete physical and visual access to the movable core of the DASA-TRIGA will be possible at all times through the water shielding. This will enable personnel engaged in an experiment to observe the "heart" of the reactor—the nuclear core—without shutting down operations.

The entire structure which houses the reactor and its associated laboratories and experimental facilities will be of reinforced concrete. The exterior walls of the building will be 10 inches thick; other walls will be up to

12 feet in thickness. The building will be on three levels, two of which will be below ground. This will provide further protection against release of extraneous radiation, the earth fill providing the shielding. Shielding within the building will consist of lead shields and thick high-density concrete walls and doors. Air from the building will be constantly monitored and filtered before being exhausted. Systems of automatic controls and interlocks will provide added safety measures.

The DASA-TRIGA's inherent safeness will be due to the physical properties of the unique fuel-moderator elements. As the reactor power level approaches its peak, the self-regulating characteristics will automatically bring the power level down to normal operating levels. In effect, the DASA-TRIGA will possess a built-in "thermostat" to assure safe operation.

The DASA-TRIGA will enable the scientists to duplicate, in a safe controlled operation, a great many of the types of radiation exposure necessary for biomedical experiments. Activation analysis will be used to determine traces of elements in body tissues and fluids, detect small chemical changes within cancerous cells, and assist in study of bone growth and diseases. Studies of the radioactive nuclides and chemistry of very low concentration solutions will be carried out.

Mankind will benefit in many ways as a result of data obtained with this installation. In peace or war, knowledge of radiation effects on biologic systems, with particular emphasis on man, is essential to the well-being of mankind. (OPA, DOD)

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NAMRU 2 Investigates Parasitology in North Borneo

By invitation of Dr. John Clapham, Director, Medical Services, Colony of North Borneo, CAPT Robert A. Phillips MC USN, Commanding Officer, U.S. Naval Medical Research Unit No. 2, Taipei, Taiwan, dispatched a research team to Jesselton to conduct field investigations in parasitology. The group consisting of an investigator (CDR Robert E. Kuntz MSC USN, parasitologist), three U.S. Navy technicians (Woodrow L. Bistline HMC, Bob R. Davis, HM1, parasitology; Richard J. Hegg HMC, virology) and seven Chinese technicians trained at NAMRU No. 2 were flown directly from Taipei to North Borneo by Fleet Activity Support Squadron 21.

An invitation to make investigations in North Borneo was accepted with enthusiasm since it represents an area in which there have been very few survey type studies on the intestinal parasites of man and animals. Field activities were directed along two principal lines——survey of intestinal parasites of different peoples in the vicinity of Jesselton and two inland areas, and study of all categories of parasites common to wild and domestic animals in the same areas. Sera were taken from peoples of different ethnic groups

and backgrounds, and sera and tissues were obtained from lower vertebrates to serve as a basis for a cursory serologic study of virus diseases.

The expedition, a continuation of the Navy's program in biologic and geomedical studies in the Orient and southeast Asia, provided an opportunity to obtain considerable basic information and biologic materials from an undeveloped area still somewhat neglected by the advances of modernization. During the 5 weeks in the field, approximately 1200 vertebrates were examined for parasites and prepared for study by the museums and educational institutions of the United States. Blood smears, as well as extensive collections of helminths and ectoparasites were processed for study by a number of investigators who have cooperative projects with the Parasitology Department of NAMRU No. 2. Materials were also obtained for teaching purposes for courses in parasitology and tropical medicine at the Naval Medical School, Bethesda, Md.

It is anticipated that the collections obtained by the recent expedition will add considerably to the existing knowledge of the zoogeography of helminth parasites and provide basic information on certain parasites common to man and lower vertebrates. These materials may be employed comparatively with the results of other studies which have been made in Taiwan and southeast Asia. Stool specimens from 800 persons living in different areas will serve as a basis for a report which may be used as an index of the degree of infestation by intestinal parasites in residents of North Borneo. (NAMRU No. 2)

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BUMED INSTRUCTION 6230.11 4 November 1960

Subj: Malaria; control and prevention

Military malaria control and prevention depend on mosquito control, individual protective measures, and chemoprophylaxis. Because the naval operating forces may be required to deploy component units on short notice to any place in the world, it is necessary that components subject to deployment to malarious areas be prepared, at all times, to institute chemoprophylactic and other preventive measures. This directive establishes policy regarding control and prevention of malaria in Navy and Marine Corps personnel.

BUMED NOTICE 1416 10 November 1960

Subj: Submission of qualifications by officers of the Medical Department selected for promotion

Requirements for letters of qualification from active-duty officers and warrant officers selected for promotion are cancelled.

Recent Research Reports

U.S. Naval Medical Research Institute, NNMC, Bethesda, Md.

1. Inhalation Toxicity Studies on a Triaryl Phosphate Hydraulic Fluid. MR 005.04-0001.03, Report No. 2, 1 April 1960.
2. Water and Mercury Manometer for the Static Calibration of Electrical Pressure Transducers. Memorandum Report 60-2, MR 005.01-0021.01, 20 May 1960.
3. Toxicological Properties and Stereochemical Configuration in Derivatives of the Tropanol Series. MR 005.06-0010.01, Report No. 18, 24 May 1960.
4. Selection of an Erythromycin-Resistant Strain of Rickettsia Prowazekii. MR 005.09-1200.02, Report No. 4, 27 May 1960.
5. Epidemiological Study of Dental Disease in New Zealand. I. The Dental Caries Prevalence Rates and Their Relationship to the Minerals in the Soil, Water, and Vegetables of Napier and Hastings - 1959. MR 005.12-5000.01, Report No. 9, 24 June 1960.
6. Summaries of Research 1 January - 30 June 1960.

U.S. Naval Medical Research Unit No. 3, Cairo, Egypt, #540, FPO, NYC

1. Incidence of Congenitally Abnormal Hemoglobins Among Children in Cairo, U.A.R. MR 005.06-0051.2.03, April 1960.
2. Laboratory Evaluation of Low Concentrations of Molluscicides Used as Chemical Screens. MR 005-1035.10.01, April 1960.
3. Identity, Classification, and Distribution of Vertebrate Hosts of Parasitic Arthropods. Progress Report for Fiscal Year 1960. MR 005.09-1402.7.07, June 1960.
4. Fleas and Their Relationship to Disease in Vertebrates Including Man. Progress Report for Fiscal Year 1960. MR 005.09-1402.5.01, June 1960
5. Lice and Their Relationship to Disease in Vertebrates Including Man. Progress Report for Fiscal Year 1960. MR 005.09-1402.8.03, June 1960
6. Mites and Their Relationship to Disease in Vertebrates Including Man. Progress Report for Fiscal Year 1960. MR 005.09-1402.10.01, June 1960.
7. Ticks and Their Relationship to Disease in Vertebrates Including Man. Progress Report for Fiscal Year 1960. MR 005.09-1402.3.11, June 1960.

U.S. Naval Air Development Center, Aviation Medical Acceleration Laboratory Johnsville, Pa.

1. Design and Construction of Physiological Electronic Systems Using Operational Amplifiers. MR 005.15-0002.7, Report No. 9, 7 April 1960.
2. NADC Biological Instrumentation Symposium of 10 December 1958; sixth letter report concerning. MR 005.15-0002.2, 5 July 1960.

U.S. Naval Medical Field Research Laboratory, Camp Lejeune, N.C.

1. Personality Correlates of Marine Corps Helicopter Pilot Performance. MR 005.15-1001.1.3, August 1960.

From the Note Book

Cover Artist. The talented artist who prepared the holiday cover of the News Letter this year is David A. Culbertson HM2 USN, Medical Illustration Department, Naval Medical School, NNMC, Bethesda, Md. Culbertson, who did some of the anatomic drawings for the newly revised chapter, Anatomy and Physiology, of the Handbook of the Hospital Corps—to be off the press in the near future—is also Instructor of the Medical Illustration School, a unit of the Medical School.

Hand Board at USNH, Philadelphia. A Hand Board—consisting of the Chairman, Chief of Orthopedics, CAPT W. D. Bundens Jr; Heads of Plastic Surgery and Neuro-Surgery branches; two civilian consultants; and recorder—has been established at the U. S. Naval Hospital, Philadelphia, to consider and recomment treatment, management, and disposition of all hand cases admitted to the sick list and referred by the Ward Medical Officer. The function of the Board is to provide the best possible care for patients with injuries or disabilities of the hand, in addition to offering an excellent teaching session for staff residents and interns. Dr's James T. Metzger and Richard S. Oakey Jr currently will serve as consultants for the biweekly meetings of the Board.

Staff, USNH, San Diego, Active in Professional Meetings. In addition to those listed in the last issue of the News Letter, staff Medical officers of the U. S. Naval Hospital, San Diego, Calif., during October participated in professional activities and meetings in the U. S. Included are:

CAPT William I. Neikirk, Chairman of the Military Section, presided over seminars, roundtables, and general sessions of the Annual Meeting of the American Academy of Pediatrics in Chicago.

CAPT William S. Stryker presented two papers—Etiology of Cavus Foot; Diagnosis and Clinical Treatment of Fat Embolism—at the Armed Forces Orthopedic Seminar, Walter Reed Army Hospital, Washington, D. C.

LCDR Charles F. Dungar and LT Robert D. Visscher prepared an exhibit—Isotope Localization of the Placenta—which was monitored by the latter at the 46th Annual Clinical Congress for Academic Advancement in Obstetrics and Gynecology (American College of Surgeons) in San Francisco.

U. S. Death Rate - 1959. Deaths in the U. S. during 1959 numbered 1,656,814—9.4 deaths per 1000 population—a rate almost the same as that for 1956, but over 1% lower than the 1958 rate and about 2% lower than that of 1957. The higher rates of these latter two years resulted primarily from the influenza epidemic. The rates per 1000 population in 1959 were 10.8 for white males, 7.9 for white famales, 11.3 for nonwhite males, and 8.6 for nonwhite females. (PHS, DHEW)

Three-Year Report on Acute Conditions. Seasonal variations in acute conditions striking Americans over a 3-year period ending June 1960 are depicted in the latest published report of National Health Survey (B-24). During this period, 1161 million acute conditions occurred, averaging 6.8 for each person in the U.S. Healthiest quarter was July - September (16.6%); April - June was next (21.4%); followed by October - December (29.8%) and January - March (32.2%). Well over 50% of all these short-term disabilities were of respiratory origin. Injuries were a distant second, then came infectious-parasitic conditions, "all other," and digestive tract illnesses. (Washington Report of the Medical Sciences, November 21, 1960)

Carcinostatic Properties of Actinomycin. From studies conducted on Chang conjunctival cells and HeLa cells treated with actinomycin, the authors demonstrated changes similar to those resulting from prolonged ribonuclease treatment. Actinomycin has been reported as an inhibitor of respiration, Kreb's cycle metabolism, and pantothenate-dependent reactions. In addition to these toxic reactions, the data suggest that the carcinostatic quality of actinomycin may be mediated through its effect on nucleic acid metabolism (D. Rounds, et al, Antibiot Chemother, October 1960)

Siliconized Intestinal Decompression Tubes. Application of silicone to a rubber tube renders its surface smoother and much less irritating to the nasal mucosa. Furthermore, it is much easier to clean. Silicone-treated intestinal decompression rubber tubes have advantages over Silastic tubes; they are: (1) resilient and elastic, inhibiting knot formation, (2) radiopaque, (3) less permeable to intestinal gases, and (4) resistant to bacterial growth on the surface of the tube. (M. Cantor, Amer J Surg, October 1960)

New Antiamebic. A new antiamebic, chlorophenoxamide, that contains neither arsenic nor iodine has been synthesized. The protozoan does not develop resistance to the drug. It is a direct-acting amebicide; the bacterial flora, other protozoa not of the Entameba genus, and all metazoa tested are not affected. Toxicity is practically nil. Clinical trials have confirmed that it is effective as a chemoprophylactic and chemotherapeutic for the various forms of intestinal amebiasis. (I. de Carneri, et al, Antibiot Chemother, October 1960)

Carcinoma in Chronic Thyroiditis. The authors present a review of 189 patients undergoing thyroidectomy for chronic thyroiditis during the past 9 years. Of these patients, 103 had Hashimoto's disease, 9 of whom had associated carcinoma of the thyroid gland. In view of these findings, it is suggested that conservative treatment of chronic thyroiditis is ill advised. (C. Schlicke, et al, Surg Gynec Obstet, November 1960)

DENTAL SECTION

Effects of the Absorption of Fluoride

A recent series of coordinated investigations may be summarized as follows:

1. In a 10-year investigation of 237 persons, one-half of whom used a water supply containing fluoride in the concentration of 8 ppm for over 30 years, no clinically significant, adverse, physiologic, or functional effects resulted from absorption of the fluoride, with the exception of some dental fluorosis. There was no unusual incidence of skeletal fractures, arthritis, hypertrophic changes in the skeleton, or interference with the healing of fractures.

2. From roentgenologic investigation of this same group, it was found that consumption of water containing fluoride in the concentration of 8 ppm may, in time, produce osseous changes in the form of coarsened trabeculation and increased density. This occurred in about 10 to 15% of those involved, although in most instances the changes were difficult to detect with reasonable certainty.

3. Study of 79 bodies of suddenly deceased persons in areas in which the fluoride in the drinking water ranged from 0.0 to 8.0 ppm, has contributed information as to the histologic and chemical characteristics of human bone and soft tissues under variable conditions with respect to ingestion of fluoride.

4. Comparisons were made of the histologic and chemical findings in the tissues of two suddenly deceased persons of comparable age and experience, except that one had lived in an area in which the water was high in fluoride (8 ppm), the other in an essentially nonfluoride area. Increased bone density coarsened trabeculation, and an increased content of fluoride in the bones were found in the case from the fluoride area, while osteoporosis and considerably lesser amounts of fluoride in the bones were found in the case from the non-fluoride area. Histologically, except for the findings in the skeleton, nothing suggestive of a toxic effect was observed in the tissues of the person who had been exposed to fluoride.

5. In an analytical investigation of human renal calculi, the amounts of calcium, phosphorus, and fluoride in the calculi were found to be unrelated to the quantities of fluoride ingested regularly in the drinking water.

6. Investigation of the immediate and acute, as well as the slower and less dramatic, effects of the absorption of toxic quantities of fluoride by animals revealed the existence of a wide margin of safety in the amount of fluoride

that could be handled by the body because even when fluoride was administered by slow continuous intravenous infusion, the maximum lethal dose was approximately 20 mg per kilogram for dogs and 23 mg per kilogram for mice, while that for mice administered orally was 46 mg per kilogram.

7. Normal adults whose water supply contained fluoride at the level of 1.0 ppm were challenged with a single dose of 5 mg of fluoride in 200 ml of water. Their urine was collected ten times during the prior, and the following, 2-1/2 hour periods. Whereas 65.1% of the fluoride ingested in water during the control day appeared in the urine, only 54.1% of the administered dose was recovered from the urine within the ensuing 24 hours. The fluoride was eliminated with the greatest rapidity during the first hour after the ingestion of the 5 mg dose, and thereafter the rate dropped rapidly for 8 hours and then approached the rate of 0.1 mg per hour which obtained during the control day. (C.N. Leone, The Effects of the Absorption of Fluoride: Arch Industr Health, 21: 324-325, April 1960)

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Clinical Trials of Caries-Inhibitory Dentifrices

A clinical study to determine the anticariogenic effect of toothpaste was conducted over a 2-year period at the U.S. Naval Academy, Annapolis, Md. Approximately 400 midshipmen used tooth pastes containing stannous fluoride or sodium fluoride plus lauroyl sarcosinate; a similar-sized control group used placebos. The study was conducted according to standard survey methods except that counts were based on new carious lesions rather than the usual DMFS index. This was possible because all carious lesions, except very small interproximal etchings which did not penetrate the enamel, were restored at the beginning of the study.

At the end of the first year, there was no correlation between the amount of decay and the contents of the dentifrices. At the end of the second year, the stannous fluoride users showed slightly fewer lesions, while the sodium fluoride-lauroyl sarcosinate users showed slightly more lesions than did the controls. When subjected to statistical analysis, no significant differences were found at the 5% level. In fact, most of the differences noted were not even significant at the 10% level of confidence.

Therefore, in young men of Naval Academy age, these particular decay-inhibiting ingredients failed to provide the benefits which have previously been reported by others. (CAPT F.M. Keys DC USN, Clinical Trials of Caries-Inhibitory Dentifrices: J D Res, 39: 697, July - August 1960)

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Dental Service Report DD-477

With the reporting frequency of the Dental Service Report, DD-477, reduced from monthly to quarterly, the importance of accuracy in accomplishing this report cannot be over-emphasized.

The responsibility for proper accomplishment of the DD-477 rests with the Dental officer who signs the report. This Dental officer must carefully scrutinize and analyze the report, realizing the report's importance to the Dental Division of the Bureau. The report is utilized almost every day for such purposes as improving the dental service of the Navy, estimating allowances and complements of Dental officers and Dental technicians, preparing financial budgets, and ascertaining the efficiency of dental activities.

A review of the reports reveals the following as the most common errors being made:

1. Mistakes in addition.
2. Write-in entries not placed in parentheses. (They are not to be counted in totals.)
3. Examinations greater than patient load. (Patients must be equal to or greater than examinations.)
4. Lost time not properly recorded. (Show ONLY actual WORK DAYS lost.)
5. Late reporting. (Correct reports must reach the Bureau with a minimum of delay to enable the statistical division to complete the analysis and to report the findings to the various agencies that utilize these data.)
6. Not recording the Reviewing Officer in accordance with Chapter 6-150, Manual of the Medical Department.

From a statistical standpoint, it is desirable to include all treatment efforts of Dental officers in the relatively few categories that appear on the printed lines of the Dental Service Report. It must be recognized that procedures recorded on blank lines do not contribute to the total procedures reported quarterly to the Secretary of the Navy and, therefore, cannot support the needs for which such supporting data are required. In the preparation of future reports, the dental procedures listed below shall be entered on indicated lines instead of being entered on the blank lines.

Pulp capping	7	Pericoronitis	39
Root canal treatment	7	Periodontal treatment	39
Root removal (sinus, etc)	30	Vincent's treatment	39
Impaction and surgical removal	31	Consultation	46
Gingival flap removal	38	Fracture treatment	48
Aphthous ulcer	39	Sequestrum removal	48

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90 PKV Dental X-Ray Apparatus

The Armed Services Medical Materiel Coordination Committee has recently adopted as a standard item 90 PKV Dental X-Ray Apparatus to provide the most modern x-ray unit for use at dental activities. This unit has a maximum output of 15 MA at 90 PKV and is equipped with an electronic timer with a minimum timing range from 1/30 of a second to 5 seconds. In addition to improved film detail, use of the 90-KV technique affords marked reductions in total radiation resulting in increased safety for patient and operator. Activities contemplating replacement of present x-ray apparatus should, whenever practical, withhold procurement action pending availability of the new equipment. More specific information pertaining to stock number, cost, and availability will be promulgated at a later date.

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Short Course in Partial Dentures

A short postgraduate course in Partial Dentures will be presented at the U.S. Naval Dental School, NNMC, Bethesda, Md., 9 - 13 January 1961. The course, a refresher in basic principles of design of the removable partial denture, will consist of lectures, demonstrations, a seminar, and limited laboratory exercises. Emphasis will be placed on mouth preparation, accuracy of impressions, survey and design, recording maxillomandibular relationships, and patient education. CAPT J.B. Stoll DC USN, Diplomate, American Board of Prosthodontics and Head, Prosthetics Division of the school, will be the instructor. Quotas have been assigned to the 1st, 3rd, 4th, 5th, 6th, and 9th Naval Districts, and the Potomac River, Severn River, and Naval Air Training Commands.

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Dental Corps Honors Doctor Sterling V. Mead

Dr. Sterling V. Mead, Washington, D. C., oral surgeon and Past President of the American Dental Association, was honored by 188 officers of the Navy Dental Corps with a formal testimonial dinner on Wednesday, 9 November 1960, at the Commissioned Officers' Mess, National Naval Medical Center, Bethesda, Md. Tribute was paid Dr. Mead for his outstanding contributions to the dental profession and the Navy Dental Corps.

CAPT E.G.F. Pollard DC USN, Commanding Officer, U.S. Naval Dental School, presided as Master of Ceremonies for the occasion. The first speaker of the evening was Dr. Charles H. Patton of Philadelphia, Pa., President of the American Dental Association. Dr. Patton was followed

by CAPT E. E. Jeansonne DC USN (Ret), a member of the staff of the Dental School, Georgetown University, who represented both RADM C. V. Rault DC USN (Ret), Dean of the Dental School; and the President of the Georgetown University, The Very Reverend Edward B. Bunn, S. J.

VADM O. S. Colclough USN (Ret), former Judge Advocate General, and presently Acting President of George Washington University, spoke of his association with Dr. Mead and the Navy Dental Corps. He expressed considerable pride for the accomplishments of each. Daniel F. Lynch, D. D. S., Past President of the American Dental Association, and now a close friend and professional associate of Dr. Mead, presented some of Dr. Mead's little known life history, mentioning the many accomplishments and contributions he has made to dental literature and the profession. CAPT John E. Flocken DC USN, Naval Dental School, followed with a humorous sketch of Dr. Mead's life, aided by a unique use of slide projection and musical accompaniment by the United States Navy Band which also played selected music throughout the evening.

The Honorable L. Mendel Rivers of South Carolina who introduced the legislation in Congress that ultimately resulted in autonomy for the Navy Dental Corps spoke of his close friendship with Dr. Mead and of the respect he holds for Navy dentists because of their superior professional and administrative accomplishments. Dr. Mead responded briefly and was greeted with a long standing ovation.

The main speaker of the evening, RADM C. W. Schantz, Assistant Chief of the Bureau of Medicine and Surgery (Dentistry), and Chief, Dental Division, concluded with a tribute to Dr. Mead and presented him with a plaque for his success in promoting legislation which has increased the effectiveness of the Navy Dental Corps.

Attending were: Mrs. Sterling V. Mead; Dr. Sterling V. Mead Jr; Dr. C. Willard Camalier, Past President and currently Assistant Secretary of the American Dental Association; RADMs Alfred C. Chandler and Spry O. Claytor, both retired Chiefs of the Navy Dental Corps; RADM Henry R. Delaney DC USN (Ret); RADM C. R. Wells DC USNR (Ret), Past President of the American Dental Association; RADM George C. Paffenbarger DC USNR, American Dental Association research associate at the National Bureau of Standards; RADM W. H. Christensen DC USNR; and Dr. H. A. Swanson, Regent of the American College of Dentists.

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Personnel and Professional Notes

LCDR Scribner Addresses Rotary Club. LCDR J. H. Scribner DC USN, Senior Dental Officer on board the USS ESSEX, recently appeared before the Front Royal Rotary Club of Virginia, discussing U. S. Naval Dental

participation in Operation Deep Freeze. The presentation, utilizing color slides, described setting up bases in support of the International Geophysical Year programs with emphasis on dental aspects.

Dr. Saklad Lectures at NDS. Maurice J. Saklad, D. D. S., New York City, presented a lecture—Recommended Procedures for Prosthetic Problems Requiring Esthetics—on 10 November 1960 at the U. S. Naval Dental School before Dental officers of the Armed Forces, civilian dentists, and other interested scientific personnel of the Washington, D. C. area as part of the special lecture series of the School. Dr. Saklad, a former member of the faculty of New York University College of Dentistry (Department of Physiology, Operative Dentistry, and Crown and Bridge), described a simplified and practical approach for treatment of esthetic problems without becoming involved with complicated instruments and time consuming techniques. The discussion reviewed: (1) treatment of normal misshapen misplaced teeth, (2) replacement of missing teeth, and (3) additional clinical problems involving esthetics.

CAPT Lesney Represents Bureau at Conference. CAPT T. A. Lesney DC USN, Chief of Dental Service, U. S. Naval Hospital, Great Lakes, Ill., and Diplomate American Board of Oral Surgery, represented the Bureau of Medicine and Surgery at the Third Conference on Graduate Education in Oral Surgery at Chicago, Ill., 28 November 1960.

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RESERVE SECTION

Naval Reserve Medical Specialist Units

The importance of Naval Reserve Medical companies lies in the fact that they are pools of Reserve Medical Department officer talent (Medical Corps, Medical Service Corps, and Nurse Corps). In every area where there are Naval Reserve and Marine Corps Reserve training centers, the medical companies can furnish support. Training centers have a continual need, and billets are established for Medical officers in appropriate duty status (pay and nonpay) to perform physical examinations and essential services of an administrative nature. A Naval Reserve training center having a surface division authorized to train hospital corpsmen has a billet for an MC or

MSC officer up to the rank of lieutenant commander in associate pay status as a division training officer.

There is an appropriate duty with pay billet for a Nurse Corps officer at many Naval Reserve training centers to assist the Medical officer in performance of physical examinations and to instruct hospital corpsmen in nursing techniques. Some of these billets have been lost by not being utilized. The commandant of each naval district has control of appropriate duty with pay billets, and if they are not utilized by one Reserve program, he assigns them to another program.

In areas where Hospital Corps divisions have been established, further support is needed. Each of these Selected Reserve divisions has five MC or MSC billets in drill pay status. A billet also exists for a NC officer in appropriate duty pay status. The training by these officers of the division's 50 hospital corpsmen is of great importance as they hold mobilization orders to augment the fleet on M-day.

In areas where medical schools are located, billets as commandant's representatives are established for Reserve Medical officers who are on the faculty or teaching staff of the medical school. The Navy regards this as a most important billet. The commandant's representative has the responsibility of developing the Ensign Medical Program so that a representative number (5 to 10%) of the medical students are commissioned and enjoy the privilege of vacation medical research training at Navy research activities and clinical training at naval hospitals. Furthermore, he should secure a sufficient number of well qualified applicants for the Senior Medical Student Program and Naval Internship Program each year. These officers must further maintain close liaison with the district medical officer and the officer in charge of the Navy recruiting station in the area to adequately perform their duties. In like manner, MSC officers are utilized as commandant's representatives at universities, and NC officers as commandant's representatives at accredited schools of nursing. In the areas where naval hospitals are located, civilian physicians and Reserve Medical officers accredited in their specialty and prominent professionally, are utilized as consultants.

All of these support functions are of vital importance to the Navy and the Naval Reserve.

In each area where medical companies are located, some or all of these support functions are indicated. There should be an orderly flow of members to and from these support billets, and to and from active duty.

In order to do this effectively, the medical company should have a large membership. How is this accomplished? It is well known that recruiting is difficult. With the rationale of support to the area described above, the medical company assumes a more important role. The commanding officer of the training center is the representative of the Navy and head of the Naval Reserve. He will welcome a visit from the commanding officer, executive officer, training, and recruiting officers of the medical company. He is in a good position

to help in numerous ways. The training centers routinely receive a list of officer and enlisted Reserve personnel returning to the immediate area who have recently been released from active duty. A request for the names and addresses of the Reserve Medical Department officers will not be ignored. Another source is the District Medical Office. Prospective members may be written, phoned, or visited. MC, MSC, or NC officers may be pursued with an officer of the same corps. A report from the officer in charge of recruiting should be a matter of business at each meeting.

Training. Meetings should be well planned; good speakers secured; and the curriculum utilized. Programs should be submitted to the district medical officer quarterly in advance for approval.

The officer in charge of correspondence courses should sell correspondence courses to the extent that each member completes at least one a year. The commanding officer should set the example.

The training officer must sell active duty for training to the members. A 75% attendance the previous year for old members, or for the previous quarter for new members, is the basic eligibility requirement to request 14 days active duty training. Training duty is requested from the commandant (DMO) via commanding officer of the medical company. Each quarter some members should take active duty training and upon their return be prepared to give an interesting report.

Maximum Reservist. A Reservist is entitled to be credited with a maximum of 60 retirement points each anniversary of fiscal year by drill participation or completing correspondence courses, including the 15 gratuitous points. In addition, he is credited with one retirement point for each day of active duty training performed. The 60 retirement points, with 14 points for active duty for training, constitute the equivalent of being on active duty for 2-1/2 months. Let this be the goal year after year. There will then never be the unpleasant experience of missing a minimum (50 points) creditable year for Reserve retirement by a point or two.

Uniforms. Each member should have a blue and dress khaki uniform and should replace the gold lace on his blue uniform when it becomes tarnished and multicolored. The uniform should be worn with pride. Uniform dinner meetings—at least one in dress khaki, and one in blue bravo—should be held each year. Then the Reservist is ready to apply for active duty for training—"Have uniform, will travel."

Senior officers—commanders and captains—should repeatedly apply for selection board duty. It is a worthwhile experience. This duty is requested from the commandant (DMO). Inactive Reserve boards meet in November for flag rank, in February for selection to commander and captain, and for the lower grades in March, April, and May.

When does a Naval Reservist become truly motivated? There is no set time. He keeps ahead of the game by earning more retirement and promotion points than are needed by participating up to the hilt. He wears the uniform

each year on active duty for training. He visits district headquarters, Naval hospitals, and ships. He motivates other Reservists to participate in Reserve programs and when retirement is earned at age 60 or 62, he can look back with pride at the number he has recruited to replace him. It will be a constant source of satisfaction and he will be proud of a job well done.

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Reservists' Reemployment Rights Strengthened

A Reservist having a job for an extended period of active duty for training is entitled to additional reemployment rights which became effective 10 September 1960.

Amendments to the Universal Military Training and Service Act protect Reservists against the loss of seniority, status, pay, and vacation while the serviceman is on training duty.

The new law also provides additional protection:

1. If a Reservist becomes disabled while training and cannot perform the duties of his regular job, he is entitled to reemployment in other jobs where he can perform the duties.

2. If a Reservist is hospitalized while on training duty, he may delay application for reemployment for a period up to one year.

Reservists must request a leave of absence from their employers before leaving for military training; they must report for reemployment at the next regularly scheduled work period after their return from training, or within a reasonable time thereafter if they are delayed because of factors beyond their control. Failure to report subjects the Reservist to normal rules of explanation and discipline.

The new legislation equalizes reemployment rights of Reservists who are ordered to an initial period of ACDUTRA of not less than 3 consecutive months. Those performing 3 to 6 months' initial periods of ACDUTRA now have 31 days after their release from ACDUTRA in which to apply for reemployment.

Further details on the new law may be obtained from the Bureau of Veterans' Reemployment Rights, U.S. Department of Labor, Washington 25, D. C., or from the nearest field office of the Bureau. (The Naval Reservist, October 1960)

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Doctor Draft Possible. The Assistant Secretary of Defense (H & M) states that it may be necessary to draft physicians next spring unless more volunteers are forthcoming. It now appears there might be a shortage of some 500 physicians for the services. However, this number probably will decline between now and March 1961 as more volunteers sign up. Final decision will be made at a later date.

AVIATION MEDICINE DIVISION

Major Accomplishments in 1960

Aviation Medicine

Three 100,000 foot low pressure chambers were delivered and are being installed at: the Marine Corps Air Station, El Toro, Calif.; the Naval Air Station, Cecil Field, Fla.; and Marine Corps Air Station, Beaufort, S. C.

The Human Disorientation Device, the only one of its kind, was delivered and installed at the Naval School of Aviation Medicine at Pensacola, Florida.

The Navy Mark IV full pressure suit, developed at the Air Crew Equipment Laboratory, Philadelphia, Pa., became fully operational and was issued to fleet aircraft squadrons on the east and west coasts. This suit provides omni-environmental protection in that it is air-cooled for hot weather, insulated for cold weather, supplies oxygen for high altitudes, and provides the necessary pressure envelope for cabin decompression emergencies above 50,000 feet.

Development and testing of the new Mark V exposure suit was completed at the Air Crew Equipment Laboratory and procurement and distribution to operational units is under way.

At the Air Crew Equipment Laboratory, installation of a complete replica of the Project Mercury Capsule within the large low pressure chamber is almost complete. Here the astronaut in a full pressure suit will endure programmed static space flight simulation, during which time simulated emergencies will be effected and will be evidenced by instruments and actual automatic activation of emergency life support systems. Programmed simulated flights will require navigation, orientation, timing, and other normal piloting functions of the astronaut, during which time simulated emergencies must be met and countered in order to prevent a simulated catastrophe.

A 15-foot square room has been constructed over the hub of the centrifuge of the U. S. Naval School of Aviation Medicine, Pensacola, Fla., to study effects of slow rotation on human subjects for long periods of time. Improved instrumentation and added computer capacity to the Schools' Human Disorientation Device has been accomplished.

A bioastronautical facility was constructed at the Air Crew Equipment Laboratory which permits the study of closed ecologic systems. It is composed

of a chamber within a chamber so outboard leakage can be obtained. A test, using six men for an 8-day period, was conducted to demonstrate the versatility of the device. The oxygen was supplied by a solid oxygen source that also acted as a partial carbon dioxide scrubber. A noteworthy finding was that while methods using bottled gas as the oxygen source resulted in odors, this method did not. It is believed that the solid oxygen source also plays a major role in odor removal as well as removing a large percentage of carbon dioxide from the atmosphere.

Under direct supervision of the Aviation Medicine Technical Division of the Bureau of Medicine and Surgery, the Aviation Medical Acceleration Laboratory, Johnsville, Pa., is developing a space vehicle biopack for support of mammals for a 7-day orbital space flight in order to study effects of ionizing radiation, weightlessness, et cetera on response performance ability of animal subjects.

Astronautical Medicine

The Mark IV full pressure suit developed at the Air Crew Equipment Laboratory was selected, in competition with others, as the one to be worn by the Mercury astronauts. Certain modifications were made to fit their requirements and they were trained in its use.

At the Aviation Medical Acceleration Laboratory in Johnsville, the astronauts were trained on the dynamic flight simulator. This gave them a realistic idea of the acceleration stresses they will encounter during flight. They were also trained with display panels and controls which enable them to "fly" replicas of their orbital mission. Efforts were made at the laboratory to develop advanced means of protection against very high g forces, one means being a water-filled "iron-maiden" which permits protection against as much as 31 g's of accelerative force.

Six Medical officers were selected to conduct medical monitoring and surveillance of the Mercury capsules in flight. They, along with other Department of Defense medical personnel, will man the world-wide net of tracking and monitoring stations when the Mercury flights take place. These officers were intensively trained in medical aspects of orbital flight and are expected to provide a pool of knowhow for future space flight operations.

In order to participate fully in development of military space technologies and particularly in development of a capability for the Navy's projected manned space flight program, a naval flight surgeon was selected for assignment to fulltime duty with the Flight Systems Division, Manned Satellites, Goddard Space Flight Center, Langley Field, Va. This assignment is in connection with Project Mercury; the flight surgeon will work with the seven astronauts—four of whom are naval aviators—in human factor studies.

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Bio-Science Activities - Pacific Missile Range

The Bio-Science Office on the Staff of the Commander, Pacific Missile Range, was established on 1 February 1959. Its primary purpose is to seek the medical human factor and bio-science support requirements of the Range, to analyze them, and plan, coordinate, and initiate steps necessary to supply adequate medical and technical bio-science services to the Range and its users.

At the outset, it became apparent that the bio-science programs would fall into four main operational areas of interest. Of most immediate importance was the area of research, development, and test at the Naval Missile Center. Here there already existed the need and means to make the transition from aviation through missile to space medicine. Here, too, advances of other Navy biologic laboratories could be applied in an operational environment.

Basically, such a procedure would take advantage of the facilities and capabilities which already existed on the Range and at the Missile Center that could be utilized in biologic work with little or no modification. Because of the long lead times required in the Military Construction Program, certain aspects of bio-astronautics support required immediate advanced planning in order to have facilities available at the proper time. To get the maximum time advantage, the Life Sciences Department was established at the Naval Missile Center on 1 October 1959 with Bio-Science Office personnel filling dual billets during the early days. As this fledgling department acquired personnel, facilities, and equipment, it assumed management of its own affairs. The Bio-Science personnel relinquished this portion of their dual activities and concentrated their efforts in other areas. The Life Sciences Department of the Naval Missile Center will be given full coverage in a later issue of the Navy Medical News Letter.

Three other prime areas of Bio-Science Office interest are the Naval Air Station at Point Mugu, the Naval Missile Facility at Point Arguello, and down-range activities which include numerous island installations, range aircraft, and range ships operating in the Pacific area.

The Naval Air Station supplies base support for the entire Point Mugu area which includes the Headquarters, Pacific Missile Range, and the Naval Missile Center. Thus, the routine medical care and the occupational health of approximately 7000 to 8000 military and civilian employees is the responsibility of the Naval Air Station Medical Department. Adequate facilities for routine care and occupational health studies, including such things as specialized periodic examinations and environmental analyses, have long been lacking. Construction is now underway to correct this inadequacy and completion of an 11,000 square foot addition to the dispensary is scheduled for the end of Calendar Year 1960. With this addition, the dispensary will be an adequate industrial medical facility. The long-range goal is: (1) adequate inpatient

hospital care for military personnel of the Ventura County area; (2) adequate industrial medical care for military and Civil Service personnel; and (3) medical research facilities to complement Research, Development, Test, and Evaluation activities of the Life Sciences Department.

As has been generally publicized, the Naval Missile Facility, Point Arguello, will eventually be the major range site on the west coast from where large space vehicles will be launched. It is entirely possible that boosters larger than those programmed for Cape Canaveral will be launched here. This poses many problems for safeguarding employees on the base and the civilian population of nearby communities against such future hazards as noise, blast, fire, toxic gases and liquids, and radiation. We are thus presented with two major operational problems at the outset. Number one, the responsibility for determining the medical care requirements so that they will be available by the time large scale activities commence. At present, an industrial first aid station in the administration building is being expanded by the addition of specially modified trailers. This interim medical facility will be capable of providing emergency assistance in the event of a serious accident in the Point Arguello area and will suffice until a permanent industrial medical facility is constructed. A permanent facility has, at present, a high priority in the FY 1962 Military Construction Program.

Problem number two requires collection of background data on geology, aerology, and biology of the area. For example, we foresee the use of a variety of nuclear power devices in future missile and satellite operations with the possibility of accidental radioactive contamination. In order to determine the degree of radioactive residue, background radiation measurements on soil and water samples are being made. These samples have been taken from specially selected locations based on meteorologic information showing most likely fallout areas. Likewise, samples have been taken to obtain baseline soil chemical information since similar conditions exist with respect to possible contamination by toxic fuels, either by exhaust or accidental spills.

Colored aerial photography of the likely fallout areas is being accomplished on a seasonal basis. General color changes in foliage serve as a sensitive indicator of atmospheric and soil contamination which can then be easily checked by chemical or other means. Acoustic studies have been made in the Point Arguello area by personnel of the Naval Missile Center Laboratory Department. In joint action with Range Development and the Meteorology Division of Range Operations Department, it is planned to have radiation, toxic gas, and acoustic monitoring equipment installed on strategically located meteorologic towers. It is remotely possible that such contamination might cause crop and livestock damage in fallout areas outside of the government reservation resulting in legal action against the government. Records of background data and monitoring of environment during operations are always useful in legal action and may be the determining factors on which to base a sound legal judgment.

A review is presently being made of the available literature pertaining to toxic fuels. It is the intent and plan of the present project to determine the physiologically safe distances from accidental spills of varying quantities of toxic materials. These distances will be extrapolated for variable time exposures, and a pocket computer will be developed to show at a glance the safe distance, time, and type of protection necessary in a particular situation. This same information will also be integrated in site selection and safety criteria.

Point Arguello is of major interest from the viewpoint of biologic science. A Bio-astronautic Test and Assembly Facility for on-the-site biomedical support to include all prelaunch check of any future biologic capsule—up to and including man—has been planned at this launch complex.

The fourth area of interest of the Bio-Science Office deals with down-range facilities. Here we are confronted with a number of problems:

a. Medical care of civilians and military personnel and their dependents on island facilities

b. Medical care of personnel on range ships

c. Facilities for preparation and checkout of biologic packages prior to launch and their handling and treatment on recovery

The last item must take into account facilities aboard range recovery ships and long-range planning to support equatorial launches, whether from shipboard facilities or an island site. A hospital ship would be ideal for conversion to use as a biologic support facility and would also provide a capability for complete medical care.

Since most of the down-range island facilities under Pacific Missile Range are operated for the Navy by civilian contractors, the Bio-Science Office monitors the medical services provided for personnel in these isolated areas. Technical direction is also provided to the Pacific Missile Range contracting officer in establishing: (1) job standards to insure the assignment of qualified professional personnel, (2) industrial health engineering standards, and (3) health standards for employment. Periodic visits to the various island facilities down-range by personnel of this office have been instituted to keep a firsthand record of operating conditions. It must be borne in mind that for these isolated areas great difficulty is experienced in personnel recruitment, and facilities are not always up to continental standards.

As time permits, it is anticipated that additional attention can be given to some of the less obvious range problems, such as questions concerning length of tour, support of morale in island operations, and specialized selection and assignment techniques where new types of work are involved on which past experience does not provide adequate criteria. It is expected also that human factors studies can be conducted in some of the relatively new kinds of decision-making situations which are of prime importance, with special attention to searching for spots where human factors may produce errors in communications and where presentation of data to operational personnel may require unnecessarily complex perceptions or interpretations.

Additional activities of the Bio-Science Office are of a more general nature and include issuance of instructions for all Pacific Missile Range activities, e.g.: radiofrequency radiation hazards to personnel, safe handling of chlorinated hydrocarbons, et cetera. When problems arise not sufficiently covered by existing instructions, action is initiated to obtain the information which can then be disseminated to Pacific Missile Range activities and other interested activities as well. Industrial health surveys and consultation services have been extended to Navy activities outside the Pacific Missile Range. Close liaison is maintained with the Atlantic Missile Range and results of special tests are passed on where there is mutual interest. This has been especially true in the field of microwave radiation hazards.

A wide liaison is maintained with academic, industrial, and other governmental agencies and laboratories. Contact with these institutions is frequent and has proved to be of great value in our education and in development of ideas of mutual interest. This has been especially true in the area of bio-packs. Our original concept from surveying various rocket systems for available space has finally culminated in assignment of Project PAPOOSE to the Naval Missile Center. The purpose of this project is to provide an economic means of launching small research payloads, none of which, in themselves, would justify expenditure for individual booster and launching services. These secondary payloads are being developed by Department of Defense agencies, civilian space research activities, and colleges and universities accomplishing research under government contracts or grants.

Liaison with the Naval Reserve Units of the Eleventh and Twelfth Naval Districts has resulted in assignment of a number of qualified specialized personnel to the Bio-Science Office for their training duty. Specialties of these persons have included physiology, animal husbandry, psychology, natural resources, and agronomy. Numerous useful ideas have been exchanged and some have been implemented. This method of utilization of specialized personnel, most of whom have considerable interest in our problems, has been quite successful, and even greater assistance through this means is planned. Familiarizing Reserve personnel with our program of course, creates wider interest when they return to their normal work activities and widens the pool of potential Reserve trainees at the Pacific Missile Range.

Personnel of the Bio-Science Office have frequently been called upon to make presentations to local civic groups. Briefings have also been made to university staffs, medical societies, professional meetings, seminars for VIP's, Office of Naval Research, and others. This office actively participates in presenting technical courses to the Pacific Missile Range professional community at every opportunity. Examples include psychology of supervision, range familiarization, acoustics, and noise. A course to provide basic anatomic and physiologic orientation for electronics and other

interested professional personnel is being considered. It is the consensus that such fundamental training will aid them in applying their knowledge of the physical sciences to problems of the life sciences. Mating of the physical and biologic sciences is an important step in space medical work; where personnel have a basic understanding of each there is a greater potential for cross-fertilization of ideas which will be advantageous to the Pacific Missile Range, the Naval Missile Center, and the nation.

This office has established a working liaison with the University of Hawaii and the Atomic Energy Commission regarding operations of the Marine Biology Laboratory located on Eniwetok, as a result of the Pacific Missile Range assuming the administrative control of the island for the Department of Defense.

In summary, this office has actively encouraged development of biotechnical support near the launch sites which is an area previously overlooked at the national ranges. Familiarization of persons in authority with our program and plans has been an absolute necessity to gain the support we have mustered to date. In this educational effort, we have had close coordination with local units of our Technical Information Department and Technical Support Directorate which has resulted in a bio-science program brochure and a fully automated electronic bio-astronautics exhibit. This exhibit has presented by visual and audio means the unique combination of capabilities existing at the Pacific Missile Range which could be of immense value in any bio-astronautics effort. Briefly stated, they are:

1. Close proximity to missile industry and academic institutions
2. Launch site
3. Existence of wide variety of environmental simulation facilities which could be utilized for biologic work
4. In-house technical support capability
5. Concentration of expert electronic talent
6. Computer and data reduction capability

It must thus be concluded that this unique combination of favorable factors provides the singular opportunity of applying the results of aerospace life science research in an operational test environment. The Bio-Science Office will continue to press for the greatest possible utilization of this opportunity. (CAPT Carl E. Pruett MC USN, Bio-Science Officer, Staff, Pacific Missile Range, U.S. Naval Missile Center, Point Mugu, Calif.)

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The true worth of an experimenter consists in his pursuing not only what he seeks in his experiment, but also what he did not seek.

—Claude Bernard

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Flight Restrictions Following Blood Donations

The following portion of OpNav Instruction 3740.7 is quoted for information and guidance to flight surgeons:

"The giving of blood has become a commonplace and highly important practice. Adequate stores of blood and plasma are essential to national defense. Naval personnel should be encouraged to participate in authorized blood donor programs.

Although blood donors suffer no ill effects and the amount of blood donated is quickly replaced by normal bodily processes, the aviator is exposed at all times in flight to unusual demands for oxygen-carrying blood. Hence, the following restrictions should be placed on pilots and crew members who have donated blood:

(a) Flying personnel should be grounded for 4 days after donation of 500 ml of blood.

(b) Operational commands should consider a further limitation in flights above 35,000 feet altitude, night flying, or aerobatic or gunnery tactics for a period of one week after blood donation.

(c) In no instance should pilots or aircrewmen flying in combat or with operational groups off aircraft carriers donate blood within 4 weeks of such expected flights. This recommendation is made largely because of possible lowered resistance to fatigue or in the event of injury or illness closely following blood donation."

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